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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/973,291	10/08/2001	Wei-Fan Chen	B-4333 619139-6	6023

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Richard P. Berg, Esq.
c/o LADAS & PARRY
Suite 2100
5670 Wilshire Boulevard
Los Angeles, CA 90036-5679

EXAMINER

SOWARD, IDA M

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 04/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary

Application No.

09/973,291

Applicant(s)

CHEN ET AL.

Examiner

Ida M Soward

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) 15-49 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the Applicants' amendment filed January 6, 2004.

Election/Restrictions

Newly submitted claims 36-49 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

The inventions are distinct, each from the other because of the following reasons: the invention of claims 1-35 and the invention of claims 36-49 are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, the invention of claims 36-49 has separate utility such as the at least on distributed junction completely surrounded by the first doped region. See MPEP § 806.05(d).

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 36-49 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Drawings

The objection to the drawings as failing to comply with 37 CFR 1.84(p)(5) has been withdrawn due to the amendment filed.

Specification

The objection to the disclosure has been withdrawn due to the amendment filed.

Claim Rejections - 35 USC § 112

The rejection of claim has been withdrawn due to the amendment filed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 5, 7-9 and 13-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Ker et al. (US 6,514,839 B1).

(Figures 6H and 20, cols. 9-12 and , lines 59-67, 1-67, 1-8 and 30-63, respectively)

In regard to claim 1, Ker et al. teach a MOS (metal on semiconductor transistor) structure for ESD protection, comprising: an active region, defined on a substrate 61 of a channel region separating the active region into a first drain/source region and a second drain/source region; at least one first island 64, formed on the first drain/source region and having a first conductive segment and a first gate oxide segment GOX of the first thickness, the first conductive segment being stacked on the first gate oxide segment; a doped drain region of a first-type conductivity in the first drain/source region, defined substantially by a field oxide region FOX, the channel region and the at least one first island, and a breakdown-enhanced layer ESD, formed in the first drain/source region and contacting the doped drain region D, to reduce a breakdown voltage across the doped drain region and the substrate.

In regard to claim 3, Ker et al. teach the breakdown-enhanced layer having the first-type conductivity.

In regard to claim 5, Ker et al. teach the breakdown-enhanced layer having the second-type conductivity.

In regard to claim 7, Ker et al. teach the breakdown-enhanced layer formed under the doped drain region.

In regard to claim 8, Ker et al. teach the channel region has a gate structure consisting of a second conductive segment and a second gate oxide segment, the second conductive segment being stacked on the second gate oxide segment.

In regard to claim 9, Ker et al. teach the second gate oxide and the first gate oxide having the same thickness.

In regard to claim 13, Ker et al. teach the breakdown-enhanced layer not formed in the second drain/source region.

In regard to claim 14, Ker et al. teach the channel region having a field oxide stacked on the substrate.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ker et al. (US 6,514,839 B1) as applied to claims 1, 3, 5, 7-9 and 13-14 above, and further in view of Ker et al. (US 2002/0076876 A1).

Ker et al. (US 6,514,839 B1) teach all mentioned in the rejection above. However, Ker et al. (US 6,514,839 B1) fail to teach one breakdown-enhanced layer inside the first drain/source region while another is outside the first drain/source region. Ker et al. (US 2002/0076876 A1) teach a MOS structure having, within the active region, two breakdown-enhanced layers 105 with the same depth and the same dosage, and one the breakdown-enhanced layers inside the first drain/source region while another being outside the first drain/source region (Figure 9, pages 2-3, paragraphs [0030]-[0033]). Since Ker et al. (US 6,514,839 B1) and Ker et al. (US 2002/0076876 A1) are from the same field of endeavor (MOS structures for ESD

protection), the purpose disclosed by Ker et al. (US 2002/0076876 A1) would have been recognized in the pertinent art of Ker et al. (US 6,514,839 B1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the MOS structures for ESD protection of Ker et al. (US 6,514,839 B1) with the breakdown-enhanced layers of Ker et al. (US 2002/0076876 A1) to avoid contact spiking (page 1, paragraph [0008]).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ker et al. (US 6,514,839 B1) as applied to claims 1, 3, 5, 7-9 and 13-14 above, and further in view of Chuang et al. (6,008,080).

Ker et al. (US 6,514,839 B1) teach all mentioned in the rejection above. However, Ker et al. (US 6,514,839 B1) fail to teach pocket-implanted structures. Chuang et al. teach pocket-implanted structures 49 (Figure 6, col. 9, lines 51-60). Since Ker et al. (US 6,514,839 B1) and Chuang et al. are from the same field of endeavor (MOS structures for ESD protection), the purpose disclosed by Chuang et al. would have been recognized in the pertinent art of Ker et al. (US 6,514,839 B1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the MOS structures for ESD protection of Ker et al. (US 6,514,839 B1) with the pocket-implanted structures of Chuang et al. to limit the punch through effect (col. 9, lines 43-44).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ker et al. (US 6,514,839 B1) as applied to claims 1, 3, 5, 7-9 and 13-14 above, and further in view of Kuo (US 6,268,256 B1).

Ker et al. (US 6,514,839 B1) teach all mentioned in the rejection above. However, Ker et al. (US 6,514,839 B1) fail to teach anti-punch-through structures of internal MOS. Kuo teaches an anti-punch-through structure 13 of internal MOS (Figure 2F, col. 3, lines 45-67). Since Ker et al. (US 6,514,839 B1) and Kuo are from the same field of endeavor (MOS structures), the purpose disclosed by Kuo would have been recognized in the pertinent art of Ker et al. (US 6,514,839 B1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the MOS structures for ESD protection of Ker et al. (US 6,514,839 B1) with the anti-punch-through structure of Kuo to increase MOS performance (col. 4, lines 29-33).

Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ker et al. (US 6,514,839 B1) as applied to claims 1, 3, 5, 7-9 and 13-14 above, and further in view of Hsu (6,100,141).

Ker et al. (US 6,514,839 B1) teach all mentioned in the rejection above. However, Ker et al. (US 6,514,839 B1) fail to teach different gate oxide thickness. Hsu teaches a second gate oxide 308 and a first gate oxide 310 having a different thickness, wherein the second gate oxide is thicker than the first gate oxide (Figures 3C-3H, cols. 3-4, lines 66-67 and 1-59, respectively). Since Ker et al. (US 6,514,839 B1) and Hsu

are from the same field of endeavor (ESD MOS structures), the purpose disclosed by Hsu would have been recognized in the pertinent art of Ker et al. (US 6,514,839 B1). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the MOS structures for ESD protection of Ker et al. (US 6,514,839 B1) with the gate oxide thickness of Hsu to lower threshold voltage (col. 2, lines 30-40).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respects to MOS structures for ESD protection:

Chang et al. (6,114,226)

Hsue et al. (5,559,352)

Johnson et al. (6,034,415)

Lee et al. (US 6,703,663 B1)


Lin et al. (US 2001/0010954 A1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday, 6:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS
April 7, 2004


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800